

1. **DESCRIPTION:** Students will use process skills to complete tasks related to **glaciation and long-term climate change**.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 minutes

2. **EVENT PARAMETERS:** Each team may bring four 8.5" x 11" double-sided pages of notes containing information in any form from any source and bring up to two non-graphing calculators.

3. **THE COMPETITION:** Participants will be presented with one or more tasks, many requiring the use of process skills (e.g., observing, classifying, measuring, inferring, predicting, communicating, and using number relationships) from the following topics:

- a. Glacial formation, mass-balance, and flow
- b. Glacier and ice sheet types and forms (alpine and continental)
- c. Glacial erosion, erosional landforms, and sediment transport
- d. Glacial depositional landforms and sediments
- e. Interpretation of glaciers and glacially altered landscape features shown on USGS topographic maps
- f. Periglacial environment processes and landforms
- g. Glaciers in the hydrologic cycle: impacts on climate, streams, lakes, and oceans, sub-glacial hydrology, isostatic effects on Earth's crust
- h. Pleistocene and pre-Pleistocene glacial history: evidence and chronology
- i. Theories explaining glacial and ice sheet advance and retreat (e.g., Milankovich cycles)
- j. Glaciers as indicators of modern global climate change



4. **REPRESENTATIVE TASKS:**

- a. Analyze and interpret features and actions of a mountain glacier appearing on a topographic map including elevation, gradient, ablation and accumulation zones, direction of flow, medial moraines, crevasses, valley shapes, erosional landscapes, and depositional features
- b. Analyze a geologic map of glacial deposits to determine the sequence of events over the course of several episodes of advance and melt-back
- c. Interpret oxygen isotope data from a sediment core to identify changes in sea level caused by glacial advance and melting

5. **SCORING:** High score wins. Points will be awarded for the quality and accuracy of responses. Ties will be broken by the accuracy and/or quality of answers to pre-selected questions.

Recommended Resources: All reference and training resources including the **Bio/Earth CD** are available on the Official Science Olympiad Store or Website at <http://www.soinc.org>.